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No. 1

ECONOMIC INTELLIGENCE REPORT

OPERATIONS OF THE INLAND WATER FLEET OF THE USSR

CIA HISTORICAL REVIEW PROGRAM
RELEASE IN FULL

CIA/RR ER 60-17
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CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

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FOREWORD

The purpose of this report is to record major developments since World War II that have affected the organizational apparatus, traffic operations, and fleet characteristics of river transport in the USSR and thus to establish a base against which developments projected through the Seven Year Plan (1959-65) may be evaluated as they occur. The figures used in most of the tables are based on river transport operations in 1955, the latest year for which complete information is available. No changes are believed to have occurred since that time that would influence significantly the interpretation of the figures used, but significant data on activities of a later date have been incorporated when available.

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OPERATIONS OF THE INLAND WATER FLEET OF THE USSR*

Summary and Conclusions

At the present time the inland water fleet of the USSR is estimated to consist of units totaling 1.8 million horsepower (hp), of which approximately 1.0 million hp is steam driven. The non-self-propelled fleet is estimated at 8.6 million deadweight tons (DWT)** of which 4.0 million DWT are of wooden construction. Formerly, most of the self-propelled ships were powered by steam, and most of the non-self-propelled fleet consisted of wooden barges. Beginning in 1959, the use of steam engines and wooden hulls in new construction was eliminated. A large increase planned in self-propelled cargo ships should provide a substantial improvement in service on the waterways by 1965. The addition of motor ships is essential if the increasing volume of dry cargo available is to be handled efficiently and economically.

The volume of cargo hauled by the inland water fleet of the USSR in 1958 was 178.3 million tons,*** an increase of 387 percent above the 36.6 million tons hauled in 1945. By 1965 this traffic should increase to about 268 million tons.

At the end of World War II, when rapid economic rehabilitation of the USSR was essential, the inland water fleet, badly damaged and depleted by war losses, was in no condition to provide adequate transportation. Consequently, proportionately greater amounts of capital investment and applied technology were allocated to the other more efficient and reliable types of transportation.

An additional problem and a major threat to the growth of river transport in the USSR arose in the 1950's as the construction of a series of power dams began to convert the river systems into a chain of lakes and reservoirs. Although the alterations to the waterways created ideal conditions for long, productive hauls, the inland water transport system lacked a fleet suitable for deep water operations.

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* The estimates and conclusions in this report represent the best judgment of this Office as of 1 June 1960.

** Deadweight tonnage is the carrying capacity of a ship in metric tons -- that is, the difference between the displacement light and the displacement loaded.

*** Unless otherwise indicated, tonnages are given in metric tons throughout this report.

The long trains of non-self-propelled wooden barges and timber rafts, which had been adequate conveyors of cargo on the inland waterways, became unsatisfactory or impossible to use on the lakes and reservoirs. Reduced currents not only slowed the downstream movement of the non-self-propelled traffic but also increased demands for power, consumption of fuel, and operating costs of the low-powered, low-speed tug fleet. Earlier freezing and later thawing of the reservoirs also shortened the navigation periods and introduced a requirement for river icebreakers. Thus the net effect of the construction of dams has been economically adverse to the inland water transport system and its equipment.

During 1945-58 the unprofitable operations in the eastern regions of the USSR were heavily subsidized by the profitable shipment of petroleum and petroleum products on the Volga River and by the shipment of timber in the western regions. Moreover, there has been an increase in the volume of unprofitable dry cargo shipped on all rivers throughout the USSR. These trends are expected to continue through 1965, except that an increased supply of self-propelled ships may help to reduce high operating costs. Because of the high operating costs and the low rates necessary to attract freight, inland water transport must be subsidized by the central and republic budgets. Between 1950 and 1958 the average cost of inland water transport decreased from 4.13 kopecks* to 3.15 kopecks per traffic-kilometer, but the operating ratio** during the same period probably never dropped below 94. To meet additional nonoperating expenses, the operating ratio must decrease to about 85, and to make inland water transport financially self-sufficient, a further decrease to 57 would be necessary. If tariffs remain the same and operating costs continue to decline, it may be possible to achieve an operating ratio of 85 by 1965.

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* All values in this report are given in current rubles (100 kopecks per ruble) and may be converted to dollars at the official rate of exchange of 4 rubles to US $1. This conversion rate should be used with caution, however, inasmuch as it is arbitrarily established and probably bears little relation to the actual dollar value of transportation services.

** The operating ratio is an index used to express a quick, although crude, indication of the financial position of a transportation system. A ratio higher than 100 indicates that the current operating expenses are higher than earned operating revenue.

I. Introduction

The inland waterways of the USSR are distributed among four important basins: the Central, the Northwestern, the Northern, and the Eastern.* These basins are distinguished from each other principally by climatic and topographic differences that determine the duration of the navigation season and the controlling depths of the waterways. Certain sections of individual river systems and the operations of their respective steamship agencies overlap into other basins.

In 1955 the length of the river and canal system in the USSR was approximately 500,000 kilometers (km), of which 131,900 km were navigable and 117,700 km were equipped with aids to navigation. 1/** The rivers in the eastern regions, the longest in the USSR, handle only a small volume of traffic. The most important river, the Volga, handles more than one-half of the total inland water freight. Canal systems in the European USSR constitute vital links between major waterways. The combined length of the most important of these canals is approximately 2,100 km.

II. Performance

Inland water transport in the USSR generally is characterized by low charges to the shipper, but it is slower and less reliable than the other types of transport and is used primarily for the delivery of low-priority bulk commodities.

Inadequate port facilities and a lack of appropriate ships have held down the efficiency of inland water transport. Moreover, the inland water carrier network as a whole is not endowed with natural conditions conducive to high freight density. The navigation seasons vary among the systems from as little as 3 months to almost never longer than 8 months. Except on the Volga, the riverbeds are seldom suitable for long hauls in deep-draft ships. In 1955 the average freight density of all inland water transport was 0.8 million ton-kilometers (tkm) per kilometer of route. Only on the Volga, with a density of 9.6 million tkm per kilometer of route, does the density of traffic compare favorably with the average achieved on the railroads. The freight density on the Volga Railroad System, which has branch lines paralleling the river between Vol'sk and Astrakhan, was 6.3 million tkm per kilometer of route in 1955. 2/

* The designations of river basins used in this report were chosen because their delineation conforms best to the individual problems and considerations peculiar to river transport. In some Soviet publications the river basins are classified according to the ocean or sea into which the rivers flow.

** For serially numbered source references, see Appendix C.

In the eastern regions of the USSR, where increasing industrial development requires north-south movement of freight and where there are no parallel rail lines, the traffic density of the Ob' and Lena Rivers in 1955 was only 0.3 million tkm per kilometer of route and on the Yenisey River was less than 0.7 million tkm per kilometer of route.

The limitations to inland water transport outlined above have led to a reduction in the share of such transport in the total cargo turnover of the USSR from 7.4 percent in 1940 to 5.8 percent in 1955. Likewise the share of inland waterways in the total tonnage hauled has declined from 4.7 percent in 1940 to 2.7 percent in 1955. The performance of inland water transport and the total cargo hauled by all types of transport are shown in Tables 1 and 2, respectively.*

In 1955, performance of inland water transport in the USSR had increased to 88 percent in ton-kilometers and to 91 percent in tons-hauled above that in 1940. In 1958 these increases had grown to 138 percent and 145 percent, respectively. The growth of inland water transport during 1956-58 was impressive in spite of recently developed hindrances to inland water transport in the areas where power dams are being constructed -- the average annual increase in ton-kilometers was 8.3 percent and of tons-hauled 8.6 percent. During the Seven Year Plan (1959-65) the scheduled increases indicate an average annual growth of less than that achieved during 1956-58, as shown in Table 3.**

The rate of growth in the performance of inland water transport in the USSR during 1956-58 reflects the more efficient use of the growing fleet of self-propelled ships, which increased its share of total inland water traffic from 7.5 percent in 1955 to about 18 percent in 1958. The declining rate of growth planned for inland water traffic through 1965 is the result of the expected absolute decrease in rafted timber and the relative decrease in petroleum traffic in the Volga area that will not be offset by the absolute increases in traffic planned for the eastern regions. Another factor tending to inhibit the rate of growth of inland water traffic is the reconversion of the fleet that is being forced by the extensive program for construction of hydroelectric dams now underway in the USSR.***

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* Tables 1 and 2 follow on pp. 5 and 6, respectively.

** Table 3 follows on p. 7.

*** For a discussion of the organization of the river fleet of the USSR, see Appendix A.

Table 1

Traffic Hauled by Inland Water Transport of the USSR, by Type of Traffic
Selected Years, 1940-58, and 1965 Plan

Inland Water Traffic	1940 a/	1945 a/	1950 a/	1955 a/	1958 b/	1965 Plan c/
Total cargo						
Turnover (billion metric ton-kilometers)	35.9	18.6	45.9	67.4	85.5 d/	140.0 e/
Hauled (million metric tons)	72.9	36.6	91.5	139.1	178.3 d/	267.5 e/
Average length of haul (kilometers)	493.0	509.0	502.0	484.0	479.5	523.3
Percentage of total river cargoes hauled	100.0	100.0	100.0	100.0	100.0	100.0
Petroleum and petroleum products						
Turnover (billion metric ton-kilometers)	12.1	6.3	12.0	14.3	15.3	23.0
Hauled (million metric tons)	9.7	5.5	11.9	14.4	16.2	24.5
Average length of haul (kilometers)	1,259.0	1,164.0	1,018.0	1,000.0	944.4	938.7
Percentage of total river cargoes hauled	13.3	15.0	13.0	10.4	9.1	9.2
Timber rafted						
Turnover (billion metric ton-kilometers)	11.7	5.1	17.2	23.9	30.0	30.0
Hauled (million metric tons)	32.8	15.9	42.4	56.2	68.4	78.5
Average length of haul (kilometers)	357.0	320.0	406.0	425.0	438.5	382.1
Percentage of total river cargoes hauled	45.0	43.5	46.3	40.4	38.4	29.3
Dry cargo						
Turnover (billion metric ton-kilometers)	12.1	7.2	16.7	29.2	40.2	87.0
Hauled (million metric tons)	30.4	15.2	37.2	68.5	93.7	164.5
Average length of haul (kilometers)	398.0	472.0	448.0	426.0	429.0	528.9
Percentage of total river cargoes hauled	41.7	41.5	40.7	49.2	52.5	61.5
Passengers						
Turnover (billion passenger-kilometers)	3.8	2.3	2.7	3.6	4.0 d/	5.5
Hauled (million passengers)	73.0	38.5	53.6	82.4	102.2 d/	140.0
Average length of haul (kilometers)	52.0	60.0	50.0	43.0	39.1	39.3

a. 3/
b. Unless otherwise indicated, data are from source 4/. Individual breakdowns are based on percentage increases above 1955 and have been adjusted to figures for total cargo turnover and total tons hauled, which are absolutes.
c. Unless otherwise indicated, data are from source 5/. Individual breakdowns are based on percentage increases above 1958 for which absolute figures have not been published. Figures have been adjusted to correspond with increases scheduled for total cargo turnover and total tons hauled.
d. 6/
e. 7/. Based on percentage increases above 1958.

Table 2

Cargo Hauled by All Types of Common Carriers in the USSR a/
Selected Years, 1940-58

Type of Transport	Cargo Turnover (Billion Metric Ton-Kilometers)					Cargo Hauled (Million Metric Tons)				
	1940 b/	1945 b/	1950 b/	1955 b/	1958 c/	1940 b/	1945 b/	1950 b/	1955 b/	1958 c/
Total transport	487.4	374.6	713.1	1,164.7	1,604.5	1,563.2	877.6	2,834.0	5,241.5	8,435.3
Rail	415.0	314.0	602.3	970.9	1,302.0	592.6	395.2	834.3	1,267.0	1,616.9
Maritime	23.8	34.2	39.7	68.9	106.4	31.2	20.2	33.7	53.7	70.8
Inland water	35.9	18.6	45.9	67.4	85.5	72.9	36.6	91.5	139.1	178.3
Motor vehicle d/	8.9	5.0	20.1	42.5	76.8	858.6	420.0	1,859.2	3,730.0	6,474.4
Pipeline	3.8	2.7	4.9	14.7	33.8	7.9	5.6	15.3	51.7	94.9

a. Totals are derived from unrounded data and may not agree with the sum of their rounded components.
b. 8/
c. 9/
d. Including noncommon carriers. For a definition of noncommon carrier, see the first footnote on p. 29, below.

Table 3

Rate of Growth of Cargo Hauled by Inland Water Transport of the USSR
Selected Years, 1940-58, and 1965 Plan

	Cargo Turnover		Cargo Hauled	
Year	Billion Metric Ton-Kilometers a/	Average Annual Increase (Percent)	Million Metric Tons a/	Average Annual Increase (Percent)
1940	35.9		72.9	
		4.3		4.4
1955	67.4		139.1	
		8.3		8.6
1958	85.5		178.3	
		7.3		6.0
1965 Plan	140.0		267.5	

a. 10/

A. Distribution of Traffic

1. By Republic

Approximately 93 percent of the ton-kilometers and 89 percent of the tons hauled by inland water transport in the USSR are carried by the steamship agencies in the RSFSR. In the remainder of the USSR, only the Ukrainian and Belorussian SSR's handle significant amounts of traffic, principally on the Dnepr' River, as shown in Table 4.*

2. By Major River Basin and River System

The distribution of inland water traffic in the four major river basins of the USSR in 1955 is shown in Table 5.** The pattern of traffic in each of these basins varies greatly. Dependence on inland water shipping, with the exception of rafted timber, usually is inversely related to the accessibility of other carriers. Urgency of receipt rather than competitively favorable rates appears to dictate

* Table 4 follows on p. 8.
** Table 5 follows on p. 9.

Table 4

Traffic Hauled by Inland Water Transport of the USSR
by Union Republic a/
1955

Area	Cargo b/		Passenger	
	Turnover (Billion Metric Ton-Kilometers)	Hauled (Million Metric Tons)	Billion Passenger Kilometers	Million Passengers
Total USSR	67.1	138.2	3.6	82.4
RSFSR	62.6	123.5	3.2	67.7
Ukrainian SSR	3.2	9.8	0.3	11.9
Belorussian SSR	0.8	1.5	0.04	1.1
Uzbek SSR	0.01	0.1	0.0001	0.0006
Kazakh SSR	0.3	1.1	0.04	0.1
Azerbaydzhan SSR	0.07	0.4	N.A.	N.A.
Lithuanian SSR	0.03	0.4	0.006	0.6
Moldavian SSR	0.007	0.1	0.005	0.3
Latvian SSR	0.04	1.1	0.008	0.6
Kirgiz SSR	0.02	0.1	0.0001	0.0008
Estonian SSR	0.005	0.07	0.003	0.1

a. 11/. Figures have been rounded to the first nonzero digit after the decimal.
b. Totals do not include data for the Central Asian Steamship Agency and therefore do not agree with similar totals in other tables.

the shipper's choice of transport service in the USSR. In large parts of the eastern regions, however, inland water shipping is the only system of bulk haulage available, and all types of cargoes are shipped by river without regard to their suitability to water carriage.

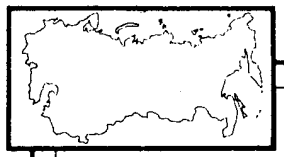
a. Central Basin

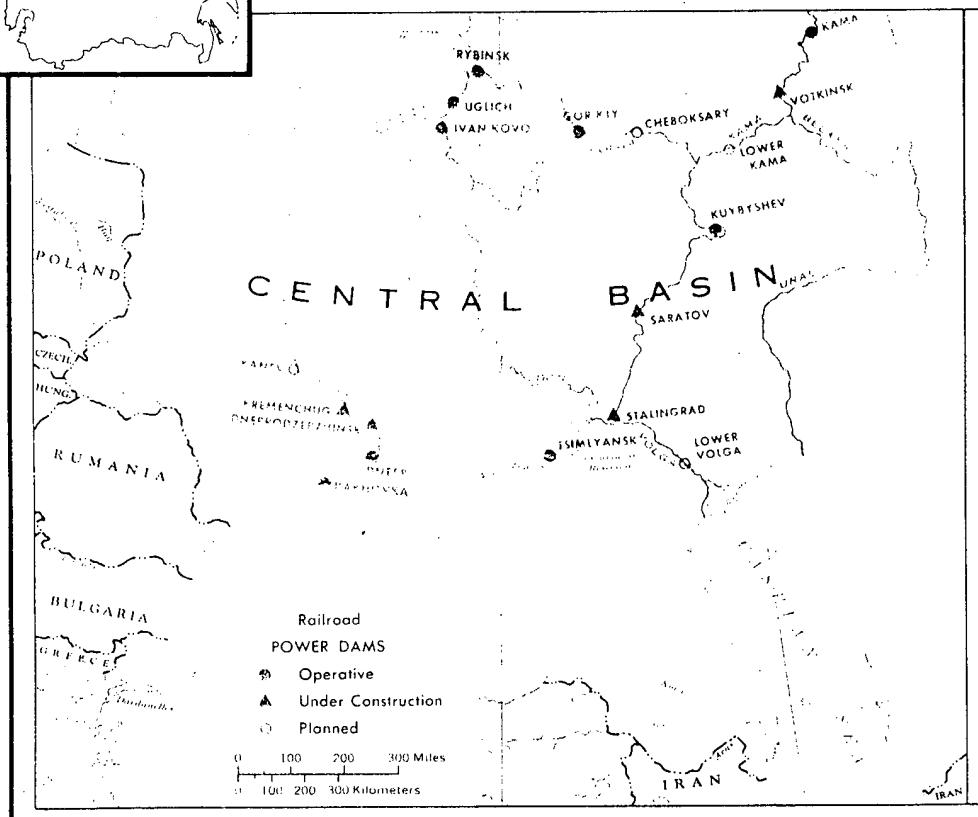
The Central Basin is the most important in the USSR and encompasses the areas served by the Volga, Kama, Belaya, Moscow, and Oka Rivers and the Moscow-Volga and Volga-Don Canals, as shown in Figure 1.* Traffic in this basin in 1955 accounted for about 60 percent (82.8 million tons) of the total inland water traffic in the USSR, including

* Following p. 8.

Figure 1

USSR: PERFORMANCE OF STEAMSHIP AGENCIES OF THE CENTRAL RIVER BASIN, 1955





CARGO HAULED*—*Million tons*

VOLGA CONSOLIDATED	20.9
VOLGA TANKER	11.4
VOLGA-DON	3.3
KAMA	21.2
BELAYA	1.6
MOSCOW	12.3

CARGO TURNOVER—*Billion ton-kilometers*

VOLGA CONSOLIDATED	19.7
VOLGA TANKER	12.5
VOLGA-DON	1.3
KAMA	8.1
BELAYA	0.3
MOSCOW	2.6

AVERAGE LENGTH OF HAUL—*Kilometers*

VOLGA CONSOLIDATED	942.6
VOLGA TANKER	1,096.5
VOLGA-DON	393.9
KAMA	382.1
BELAYA	187.5
MOSCOW	211.4

*Traffic for small rivers totalling 2.9 million tons is not included.

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Table 5

Cargo Hauled by Inland Water Transport of the USSR a/
by River Basin
1955

River Basin and Type of Cargo	Total Cargo		Percentage Distribution of Types of Cargo by River Basin
	Million Metric Tons	Percentage Distribution	
Total	139.1	100.0	100.0
Petroleum and petroleum products	14.4	10.4	100.0
Rafted timber	56.2	40.4	100.0
Dry cargo	68.5	49.2	100.0
Central Basin b/			
Total	82.8	100.0	59.5
Petroleum and petroleum products	13.0	15.7	90.3
Rafted timber	28.7	34.7	51.1
Dry cargo	41.1	49.6	60.0
Northwestern Basin b/			
Total	14.2	100.0	10.2
Petroleum and petroleum products	Negligible	Negligible	Negligible
Rafted timber	6.7	47.2	11.9
Dry cargo	7.5	52.8	10.9
Northern Basin b/			
Total	17.1	100.0	12.3
Petroleum and petroleum products	0.1	0.6	0.7
Rafted timber	12.9	75.4	23.0
Dry cargo	4.1	24.0	6.0
Eastern Basin b/			
Total	25.0	100.0	18.0
Petroleum and petroleum products	1.3	5.2	9.0
Rafted timber	7.9	31.6	14.0
Dry cargo	15.8	63.2	23.1

a. 12/
b. Derived from a table in source 13/ and applied to official totals.

90 percent of all petroleum traffic, 51 percent of the rafted timber, and 60 percent of all dry cargoes.* Before the early 1950's, navigation conditions on the Volga and Kama Rivers were relatively uncomplicated, and shipping was possible in some areas for approximately 8 months (April through November) of the year. Construction of major dams at Molotov, Votkinsk, Gor'kiy, Stalingrad, Kuybyshev, Saratov, and Cheboksary has converted the once free-flowing rivers into a series of deep lakes that freeze up early, thaw late, and have little or no current. Thus the major problem confronting this basin at present is that of maintaining large-scale traffic with obsolete ships and shipping techniques until more modern ships are added to the river fleet.

These limitations are reflected in the increases in traffic scheduled for the Central Basin during the Seven Year Plan. With the exception of dry cargo traffic, increases planned for 1965 are less than planned national increases, as shown in the following indexes for 1965.

1958 = 100

Item	USSR 14/	Central Basin
Total traffic	150	147 15/
Petroleum and petroleum products	151	145 16/
Rafted timber	115	91 17/
Dry cargo	176	189 18/

b. Northwestern Basin

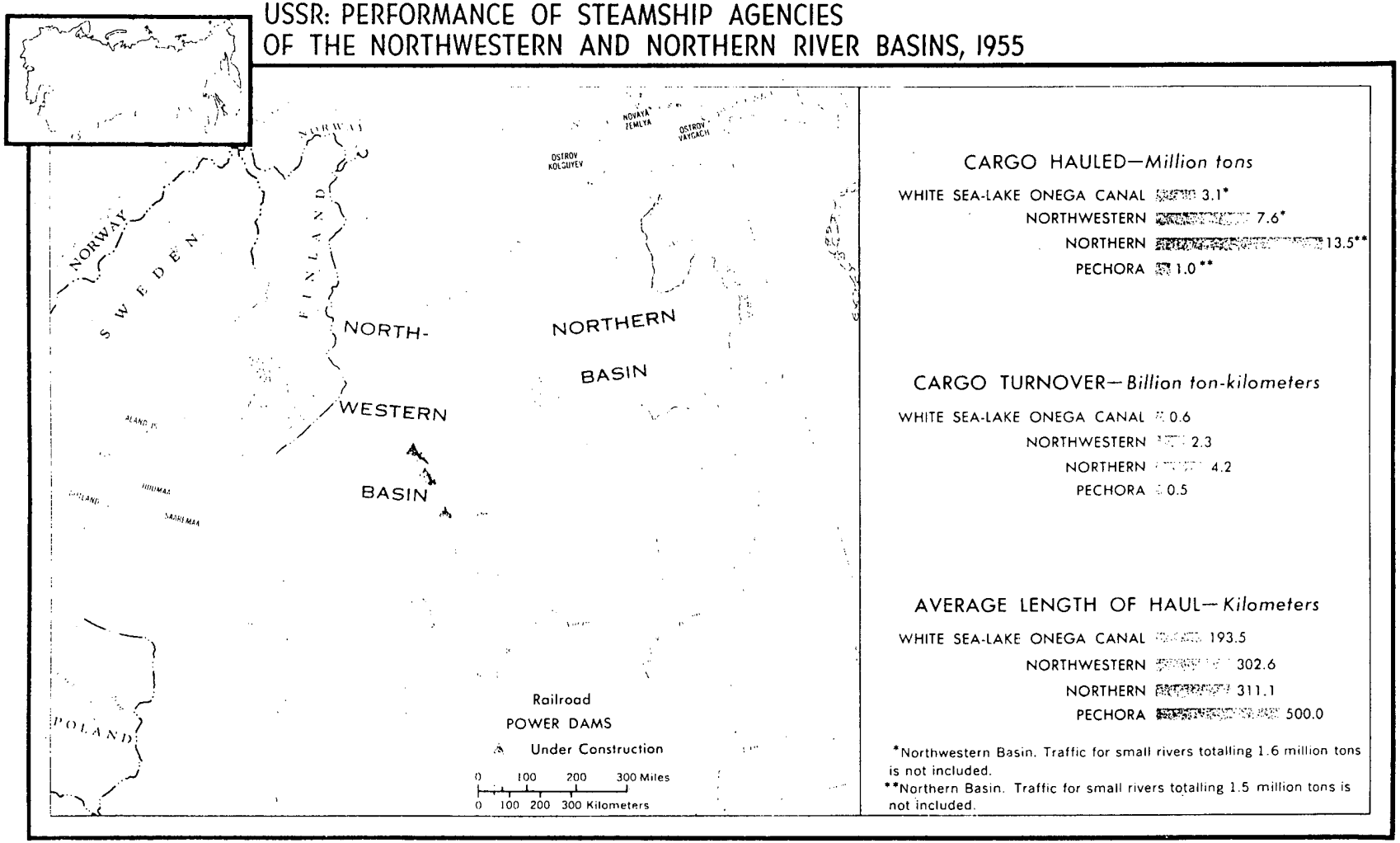
Rivers and canals of the White Sea System, the Baltic Sea System, and the Mariinskiy Canal System comprise the Northwestern Basin -- including the Neva, Svir', and Sheksna Rivers; the Ladoga' Canal (paralleling Lake Ladoga between the Svir' and Neva Rivers); the Mariinskiy Canal (Rybinsk Reservoir to Lake Onega); and the Stalin Canal (White Sea to Lake Onega), as shown in Figure 2.** Shipping in this basin is possible from May to November, except on waterways adjacent to the White Sea where navigation is shortened by at least 1 month.

Because adequate rail and maritime facilities provide the bulk of transport services in the Northwestern Basin, it is difficult to assess the significance of the inland water traffic of this basin.

* See Table 5, p. 9, above.
** Following p. 10.

Figure 2

USSR: PERFORMANCE OF STEAMSHIP AGENCIES OF THE NORTHWESTERN AND NORTHERN RIVER BASINS, 1955



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The basin is composed almost entirely of lakes and canals with complicated lock structures, resulting in high transport costs to shipping. The volume of inland water traffic is not large -- approximately 14.2 million tons, or about 10 percent of the total for the USSR. Nevertheless, an impressive traffic density of at least 4.1 million tkm per kilometer of route indicates that the system is being used rather intensively in spite of the high costs. The route is of importance because it is a secure means for the deployment of naval units between the Baltic and White Seas.

Present reconstruction of the Mariinskiy Canal System between Lake Onega and the Rybinsk Reservoir will replace 38 small wooden locks with 9 large metal ones. Scheduled for completion in 1963, this system when finished will accommodate ships of up to 5,000 DWT compared with the present limit of 800 DWT. This enlarged capacity should precipitate an increased volume of long-haul inland shipping in this basin.

c. Northern Basin

Included in the Northern Basin are the Severnaya Dvina and Pechora Rivers, both of which are open to navigation from June to October (see Figure 2*). The Severnaya Dvina forms a link between Kotlas and Arkhangel'sk and also carries traffic that originates on the Sukhona and Vychegda Rivers. Shipping is complicated by drifting ice, sandbars, and many shallows and rapids. Traffic in the Northern Basin in 1955 represented about 12 percent (17.1 million tons) of all inland water traffic in the USSR.** Because of restrictive navigation conditions the rivers in this basin are used primarily for the rafting of timber, although the Pechora River also is used for hauling large volumes of coal from Vorkuta for transshipment to sea-going ships at Nar'yan Mar. The large volume of rafted timber hauled in this basin is responsible for the low operating costs and tariff rates.

d. Eastern Basin

All rivers east of the Urals are included in the Eastern Basin -- including the Ob', Irtysh, Yenisey, Angara, Lena, and Amur Rivers, as shown in Figure 3.*** Most of these rivers are among the longest in the USSR and have the shortest navigation seasons. Depths vary from less than 3 feet to more than 20 feet in different sectors of the same river. Shoals, shifting sandbars, rapids, and fog are additional hazards to shipping.

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* Following p. 10, above.
** See Table 5, p. 9, above.
*** Following p. 12.

Except for the Amur, all of the rivers in the Eastern Basin empty into the Arctic Ocean, but only the Lena and Yenisey are used extensively for supplying Arctic locations. North of the Trans-Siberian Railroad there are no rail connections with these rivers, except the Seyda-Labytnangi branch of the Pechora Railroad, the local line between Dudinka and Noril'sk, and the Tayshet-Lena and Dezhnevka-Komsomol'sk branches of the Trans-Siberian mainline.* Consequently, river shipments are essential to the supply of the area.

Traffic in the Eastern Basin in 1955 represented about 18 percent (25.0 million tons) of total inland water traffic in the USSR, and more than one-half of this traffic moved on the Ob' and Irtysh Rivers.** The average hauls in this basin, which are among the longest in the USSR, frequently are broken by transshipment between shallow-draft and deep-draft ships. Because of these transshipments and because much of the traffic is slated for long-term storage, a large volume of the cargo is packaged as dry cargo. As a consequence, operating costs in this basin are the highest in river transport in the USSR.

3. Distribution by Type of Cargo

a. Petroleum and Petroleum Products

Less than 10 percent of all petroleum and petroleum products transported in the USSR is hauled by river carriers, as shown in Table 6.*** The largest percentage of these shipments takes place in the western USSR on the Volga River, where the costs of transportation are considerably less than those for rail and compare favorably with those for oil pipelines. Nevertheless, the share of petroleum and petroleum products carried on the inland waterways of the USSR has declined each year in relation to the amounts hauled by other types of transport.

Inland water transport has not been able to offset the competition of the growing network of oil pipelines, although theoretically it should offer some advantages in variety and flexibility in comparison with its chief competitors in low-cost haulage. Much of

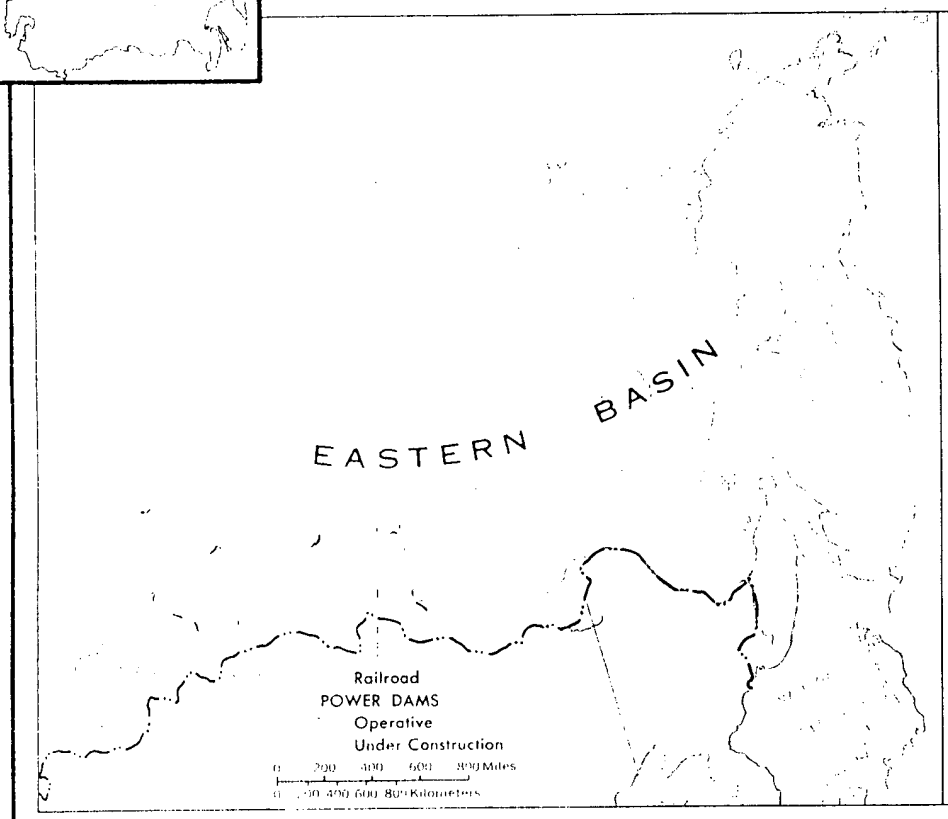
* Scheduled for completion in 1960 is a rail line that will connect Abalakovo on the Yenisey River with Achinsk northwest of Krasnoyarsk of the Trans-Siberian Railroad. Another line from Osetrovo on the Lena northward along the river to Vitim has often been considered, but no definite construction is known to be underway. Northward extensions to Abalakovo and Vitim would provide direct rail-river connections for long hauls by deep-draft ships on both the Yenisey and Lena Rivers.

** See Table 5, p. 9, above.

*** Table 6 follows on p. 13.

Figure 3

USSR: PERFORMANCE OF STEAMSHIP AGENCIES OF THE EASTERN RIVER BASIN, 1955



CARGO HAULED*— *Millions tons*

IRTYSH	5.7
OB'	5.2
YENISEY	4.0
LENA	1.1
EAST SIBERIAN	1.7
AMUR	3.0

CARGO TURNOVER— *Billion ton-kilometers*

IRTYSH	3.2
OB'	1.3
YENISEY	2.5
LENA	1.4
EAST SIBERIAN	0.3
AMUR	1.4

AVERAGE LENGTH OF HAUL— *Kilometers*

IRTYSH	561.4
OB'	250.0
YENISEY	625.0
LENA	1,272.7
EAST SIBERIAN	176.5
AMUR	466.7

*Traffic for small rivers totalling 1.0 million tons is not included.

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Table 6

Petroleum and Petroleum Products Hauled
by Selected Types of Common Carriers in the USSR
1955

Type of Transport	Cargo Turnover		Cargo Hauled	
	Billion Metric Ton-Kilometers	Percent of Total	Million Metric Tons	Percent of Total
Total	154.5	100.0	166.7	100.0
Rail a/	101.6	65.8	77.6	46.6
Maritime b/	23.9	15.5	23.0	13.8
Inland water c/	14.3	9.2	14.4	8.6
Pipeline d/	14.7	9.5	51.7	31.0

a. 19/
b. 20/
c. 21/
d. 22/

the continuing decline of inland water traffic in the total shipment of petroleum and petroleum products probably can be attributed to inadequate transshipment facilities and to the unsuitable inland water craft that are not adapted with heating systems for the transporting of high-viscosity petroleum products.

In the past, 80 to 90 percent of all petroleum and petroleum products transported by river was hauled on the Volga River. These products originated at Baku and were transshipped at Astrakhan for further movement upriver. With an increase in the supply of petroleum and the development of refineries in Bashkirskaya ASSR, Tatarskaya ASSR, and Kuybyshevskaya Oblast since World War II, the direction of movement has changed. Petroleum and petroleum products slated for river transport from these areas now include more than 5.0 million tons hauled annually through Kuybyshev alone. 23/ Petroleum and petroleum products from Baku are still carried on the Volga, but an increasing volume of traffic from the Ural-Volga fields and refineries has changed the movement of such products. Movements of petroleum and petroleum products northward to Belomorsk and westward to Leningrad are both dependent on completion of the Mariinskiy Canal System in 1963.

Very limited amounts of petroleum and petroleum products are transported on inland waterways in the Northern and Northwestern Basins, the supply function being carried out principally by maritime and rail facilities.

In the eastern regions, except for Sakhalin, there are no developed petroleum resources, and products are shipped via the Trans-Siberian rail network or in maritime ships to connecting river ports for further transshipment inland. Petroleum and petroleum products hauled on these rivers represent approximately 9 percent of the total of such shipments in the USSR. Because of a requirement for long-term reserves and a general lack of storage facilities, petroleum and petroleum products also are packaged in barrels and shipped as dry cargo, but the total amounts are not known.

Industrial developments in the eastern regions have subsisted primarily on the extensive local coal resources as sources of fuel and power. Increasing industrialization is occurring at a rapid rate, however, and will require relatively larger increases in deliveries of both packaged and bulk petroleum.

Total shipments of bulk petroleum and petroleum products by inland waterways in 1965 are expected to increase about 50 percent above those in 1958, to approximately 24.5 million tons. Of this amount, 43 percent will be hauled in self-propelled ships compared with only 2 percent in 1958. If this increase in traffic moved by self-propelled ships is carried out, a substantial change in the structure of the tanker fleet will have to be made, as may be seen in the following tabulation:

Inland Water Cargo	1955 [24]	1958 [25]	1965 Plan [26]
Total (million tons)	139.1	178.3	267.5
Of which:			
Petroleum and petroleum products (million tons)	14.4	16.2	24.5
Of which:			
In self-propelled ships			
Volume (million tons)	0.1	0.3	10.5
Percent [27]	1.0*	2.0	43.0

* Extrapolated, using the 1965 Plan and the relationships that existed in 1958.

b. Rafted Timber

Timber is one of the most valuable agricultural resources of the USSR, and the capabilities of the different river systems for moving this commodity for internal consumption and for export is of primary concern, both to the development of the timber industry and to the expansion of inland water transport. Timber and firewood account for almost one-half of all cargoes shipped on inland waterways in the USSR, and, until recently, 75 to 85 percent was moved in bound rafts and the remainder in barges and self-propelled cargo ships.* Under normal conditions, rafted timber costs less to move than any other type of cargo on inland waterways. Moreover, when timber can be effectively pushed or towed in rafts, the requirement for rail transport can be reduced substantially, and the over-all operating costs of the individual river systems also are lowered.**

In recent years the construction of hydroelectric power dams has reduced or eliminated currents and has brought about lake navigation conditions in the reservoirs. This development has caused a reduction in the profitable rafted timber traffic, particularly on the Volga River. The volume of timber traffic for individual river systems is not available for earlier years, but planned shipments from 1958 through 1965 indicate the changes that will take place during this period. The increase of 50 percent planned for total inland water traffic indicated that the shipment of timber, formerly the most important commodity, will increase 30 percent but that rafting will increase only 15 percent, as shown in Table 7.*** 28/

Shipments of timber in the Central Basin will increase from about 36 million tons to about 37 million tons. This small increase is the result of a loss of almost 3 million tons of rafted timber, which must now be hauled in ships. On the Volga River alone, a 39-percent decrease in rafted timber -- equal to approximately 3.4 million tons -- must be picked up and hauled in ships. By 1965, timber traffic on the Volga River will have increased only 300,000 tons.

Shipments of timber in the Eastern Basin, particularly on the Angara and Yenisey Rivers, are scheduled for the greatest growth.

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* The movement of timber in rafts or in ships reflects a transport requirement over and above the logs that are free-floated downstream by the logging combines. When free-floated timber is received at the transshipment points, it is further consigned either to local recipients or for further transshipment by rail or water. The latter is reflected only in totals for river transport.

** See IV, A, p. 22, below, and Table 12, p. 25, below.

*** Table 7 follows on p. 16.

Table 7

Timber Hauled by Inland Water Transport of the RSFSR, by River Basin a/
1958 and 1965 Plan

Million Metric Tons

Area	Total Timber		Rafted		As Dry Cargo in Ships	
	1958	1965 Plan	1958	1965 Plan	1958	1965 Plan
Total RSFSR	79.9	100.7	65.8	75.6	14.1	25.1
Central Basin	35.6	36.9	31.7	28.9	3.9	8.0
Kama	16.6	17.8	15.9	16.7	0.7	1.1
Volga	10.9	11.2	8.7	5.3	2.2	5.9
Other	8.1	7.9	7.1	6.9	1.0	1.0
Northwestern and Northern Basins	24.4	28.7	21.3	24.1	3.1	4.6
Northern	12.7	15.5	12.4	15.1	0.3	0.4
White Sea - Lake Onega	4.0	5.3	2.9	3.1	1.1	2.2
Other	7.7	7.9	6.0	5.9	1.7	2.0
Eastern Basin	14.7	28.7	8.4	17.6	6.3	11.1
Ob'-Irtysh	9.0	15.2	4.3	7.6	4.7	7.6
Angara-Yenisey	4.1	10.6	2.9	7.6	1.2	3.0
Other	1.6	2.9	1.2	2.4	0.4	0.5
Small rivers	5.2	6.4	4.4	5.0	0.8	1.4

a. 29/. Data for 1958 are based on the 1965 Plan and percentage increases. All data were adjusted internally so as to be additive. National increases for 1965 above 1958 are 30 percent for total timber, 80 percent in ships, and 15 percent in rafts.

The total movement of timber will increase 95 percent to almost 29 million tons, with increases to 18 million tons in rafted timber and to 11 million tons in timber carried in ships. The Eastern Basin will then account for about 28 percent of total shipments of timber by river in the USSR in 1965 compared with about 18 percent in 1958. 30/

c. Dry Cargo

The major dry cargoes hauled on inland waterways in the USSR -- timber, coal, grain, and mineral construction materials -- are shown in Table 8. About 60 percent of these shipments take place in the Central Basin where, as low-priority bulk shipments, they can be handled at lower operating costs than if shipped by rail transport. Steamship agencies in the Eastern Basin have requirements to haul proportionately larger amounts of dry cargo because of the absence of competitive carriers and a lack of local resources that must be brought in from larger industrial centers. Consequently, dry cargoes hauled in the eastern regions are equal to approximately 63 percent of all cargoes in the Eastern Basin, whereas the proportion of dry cargoes hauled in the other basins is approximately 50 percent or less of their respective totals.

Table 8

Major Dry Cargoes Hauled by Inland Water Transport of the USSR
1955, 1958, and 1965 Plan

Million Metric Tons

Cargo	1955 a/	1958 b/	1965 Plan b/
Total	68.5	93.7	164.5
Timber	11.8	14.1	25.4
Coal	8.7	10.7	21.4
Grain	6.2	6.9	10.4
Mineral construction materials	30.8	49.8	79.7
Other	11.0	12.2	27.6

a. 31/
b. 32/. Data for 1958 are based on percentage increases above 1955; data for 1965 are based on percentage increases above the estimates for 1958.

Concurrent with the necessity for inland water transport to move increased amounts of dry commodities, the economy of hauling these cargoes in towed craft has been reduced because most of the wooden barges cannot operate efficiently under reservoir conditions. At the same time the number of self-propelled freighters, although increasing, is not sufficient to offset the poor productivity of the wooden barges.

Where the expense of constructing self-propelled ships can be justified economically, as for operations on the reservoirs in the Central Basin and for long hauls in the eastern regions, the superiority of their performance in comparison with non-self-propelled craft is sharply evident. Shipping costs are reduced 30 percent, and delivery time is 2.5 times as fast. 33/ In 1955, only 10.3 million tons of dry freight were hauled in self-propelled ships in the USSR, by 1958 the amount was tripled, and by 1965 it is scheduled to reach more than one-half of the total dry freight, 34/ as shown in Table 9.

Table 9

Comparison of Total Cargo Hauled with Dry Cargo Hauled
by Inland Water Transport of the USSR
Selected Years, 1940-58, and 1965 Plan

Inland Water Cargo	1940 a/	1945 a/	1950 a/	1955 a/	1958 b/	1965 Plan c/
Total (million metric tons)	72.9	36.6	91.5	139.1	178.3	267.5
Of which:						
Dry cargo						
Volume (million metric tons)	30.4	15.2	37.2	68.5	93.7	164.5
Percent	41.7	41.5	40.7	49.2	52.5	61.5
Of which:						
In self-propelled ships						
Volume (million metric tons)	N.A.	N.A.	N.A.	10.3	30.9	83.7
Percent	N.A.	N.A.	N.A.	15.0	33.0	51.0

a. 35/ b. 36/ c. 37/

III. Estimated Growth and Size of the Inland Water Fleet

As of 31 December 1958 the inland water fleet of the USSR is estimated to have been composed of self-propelled ships totaling 1.8 million hp and non-self-propelled craft totaling 8.6 million DWT, as shown in Table 10.

Table 10

Estimated Inventory of the Inland Water Fleet of the USSR
Selected Years, 1940-58

End of Year	Self-Propelled (Million Horsepower)			Non-Self-Propelled (Million Deadweight Tons)		
	Total	Motor	Steam	Total	Metal	Wood
1940 a/	0.730	0.139 b/	0.591	5.6	2.0 b/	3.6
1945 a/	0.612	0.072	0.540	4.0	1.6	2.4
1950	0.830 c/	N.A.	N.A.	5.0 d/	N.A.	N.A.
1955	1.187 e/	0.565 f/	0.622 g/	7.1 h/	3.4 f/	3.7 g/
1958	1.785 i/	0.812 i/	0.973 g/	8.6 i/	4.6 i/	4.0 g/

a. Estimated from percentages in source 38/.
b. Estimated from percentages in source 39/.
c. 40/. Based on 1955 percentage increases above 1950.
d. 41/. Including only wooden ships added during 1946-50. Because of shortages of metal, no allowance is made for the addition of any metal barges.
e. 42/
f. 43/
g. Residual.
h. 44/. Based on percentage increases above 1950, including retirements of 1.5 million deadweight tons.
i. 45/. Based on the percentage fulfillment of the original Sixth Five Year Plan (1956-60).

Information available on plans for shipbuilding for 1959-65 indicates that capital investment will be focused primarily on the construction of self-propelled cargo ships and on the conversion of all post-World War II steamships to diesel propulsion. The emphasis during the period will be on the attainment of a more modern and efficient fleet rather than on an increase in the number of fleet units.

Except for references to ships that were not delivered from repair yards in time for the navigation seasons, the size of the inland water fleet of the USSR is indicated to have been more than adequate for the volume of traffic handled in past years. The relatively small cargo turnover projected through 1965 also indicates that no sizable expansion of either total tonnage or horsepower will be required during this period.

A. Post-World War II

During World War II the USSR lost about 1,000 self-propelled ships with a total of 118,000 hp and about 3,000 non-self-propelled barges with a total of 1.6 million DWT. At the end of 1945 the self-propelled fleet had an estimated aggregate total of 612,000 hp and the non-self-propelled fleet a total of 4.0 million DWT. Forty percent of the total fleet was inoperable or able to operate in a limited or local capacity only. 46/

B. Fourth Five Year Plan (1946-50)

The program for construction and acquisition of ships under the Soviet Fourth Five Year Plan (1946-50) called for a 49-percent increase in self-propelled ships and a 75-percent increase in non-self-propelled craft. 47/ This plan, if achieved, would have increased the fleet to 25 percent above its prewar inventory, or an aggregate total of 912,000 hp and 7.0 million DWT. Statements made in the ensuing years indicate that these specific goals were not achieved. Shipyards were badly damaged, building materials were scarce, and a large part of the existing fleet required major repairs. The size of the fleet by the end of the Fourth Five Year Plan is estimated to have been 830,000 hp and 5.0 million DWT.

C. Fifth Five Year Plan (1951-55)

No specific figures on tonnage or horsepower were announced for ships constructed during the Soviet Fifth Five Year Plan (1951-55). Reports issued by the Ministry of the River Fleet at the end of 1955 can be interpreted to indicate that plans were fulfilled, that the horsepower of the self-propelled fleet increased 43 percent above that in 1950, and that the deadweight tonnage of the non-self-propelled fleet

increased 42 percent. 48/ Imports of ships from Finland, Communist China, and the European Satellites during 1951-55 made possible a faster rate of growth than was possible in the years following World War II.

Up through 1955 the maximum additions planned since 1945 would have totaled approximately 700,000 hp and about 6.0 million DWT. Actual additions are estimated at 574,000 hp in self-propelled ships and 3.0 million DWT in non-self-propelled craft. Retirements, which are believed to be included in the 42-percent increase, totaled approximately 1.5 million DWT. 49/

By the end of 1955, inland waterways were expected to assume a traffic load of more than 35 billion tkm greater than in 1950. The existing fleet in 1950, composed largely of obsolete wooden barges 50/ and inefficient steam-propelled units, was not equipped to handle the projected increase in traffic.

A continuing shortage of steel and a limited capacity for producing diesel engines hampered both additions to aggregate capacity of barges and the acquisition of modern means of propulsion. At the end of the Fifth Five Year Plan, motor ships still represented less than 50 percent of total horsepower in the self-propelled fleet and steel barges less than 50 percent of all deadweight tonnage of the non-self-propelled fleet. 51/ Moreover, the planned level of traffic was substantially underfulfilled.

D. Original Sixth Five Year Plan (1956-60)

Progress in increasing the capacity of the inland water fleet of the USSR during 1956-58, compared with progress under previous plans, was excellent. Allocation of substantial capital and material resources was finally realized, and significant numbers of new tugs, motor ships, and steel barges were acquired.

At the end of 1958, when the original Sixth Five Year Plan was replaced by the current Seven Year Plan (1959-65), river transport had received about 67 percent in terms of horsepower of the tugs and other self-propelled ships and about 71 percent in terms of deadweight tonnage of the non-self-propelled craft scheduled under the original plan. 52/

E. Seven Year Plan (1959-65)

Construction of all steamships and wooden barges is planned to be completely discontinued before the close of the Soviet Seven Year Plan (1959-65). Steamships built after World War II are undergoing a gradual conversion to diesel or gas propulsion. The horsepower of the tug fleet is to increase 23 percent and the deadweight tonnage of

the self-propelled motor cargo fleet 120 percent. 53/ No precise data have been announced for non-self-propelled craft.

During all of the 5-year plans, motor propulsion, metal construction, and large increases in the self-propelled cargo fleet were planned. Nevertheless, because of the higher cost of constructing these types of ships and because of the insufficient capabilities of the shipbuilding industries for producing diesel engines, the emphasis was placed on low-initial-cost, low-speed steamships and on wooden barges. A substantial increase in the number of self-propelled cargo ships was not apparent until 1955, but the relative growth and performance of these ships since that time has been impressive. In 1955, self-propelled cargo ships comprised 1.3 percent of the total deadweight tonnage of tankers and 4.4 percent of the total deadweight tonnage of dry cargo ships. By 1958, these types of ships had increased to 2.3 percent and 12.0 percent, respectively, and by 1965 are expected to reach 27 percent and 23 percent, respectively.*

The planned overhaul in the types of inland water craft is not expected to be reflected throughout the entire fleet but rather in the network connecting the Volga River System with the Baltic and White Seas and on some of the Siberian rivers, where requirements for downstream shipment of supplies is particularly critical. On other river systems, where navigation is neither so extensive nor so critical, relocation of existing steamships and wooden barges can cope effectively with the traffic turnover.

IV. Financial Operations

A. Operating Profits, Costs, and Revenue

Attempts to reduce unit operating costs of inland water transport in the USSR in recent years have been less successful than for other types of transport. Changing navigation conditions, inadequate facilities and equipment, and serious underfulfillment of investment plans have been largely responsible. Between 1950 and 1958, costs per traffic-kilometer for inland water transport decreased 24 percent, from 4.13 kopecks to 3.15 kopecks per traffic-kilometer. During the same period, costs for rail transport decreased 36 percent, from 5.252 kopecks to 3.349 kopecks per traffic-kilometer. 54/ By 1958, unit operating costs for inland water transport amounted to 94 percent of those for railroads, as shown in Table 11.**

* For a comparison of the performance of self-propelled cargo ships with total tonnage hauled, see II, A, 3, p. 12, above, and Table 9, p. 18, above.

** Table 11 follows on p. 23.

Table 11

Operating Profits, Costs, and Revenue of Inland Water Transport of the USSR a/ Selected Years, 1940-59, and 1965 Plan

Year	Gross Operating Profit or Deficit (Million Current Rubles)	Operating Ratio (Operating Costs over Operating Revenue)	Gross Operating Revenue (Million Current Rubles)	Operating Revenue (Current Kopecks per Traffic-Kilometer)	Total Operating Cost b/ (Million Current Rubles)	Operating Cost (Current Kopecks per Traffic-Kilometer)	Inland Water Operating Cost as a Percent of Railroad Operating Cost
1940	Deficit e/	N.A.	N.A.	N.A.	1,116	2.81 f/	99.7
1945	Deficit e/	N.A.	N.A.	N.A.	N.A.	N.A.	91.8
1950	Deficit of 63	103.3	1,944 g/	4.0 h/	2,007	4.13 i/	72.9
1951	Deficit e/	N.A.	N.A.	N.A.	2,160	3.97 f/	75.4
1952	Deficit e/	N.A.	N.A.	N.A.	2,213	3.64 f/	72.3
1953	Deficit e/	N.A.	N.A.	N.A.	2,451	3.94 f/	81.9
1954	5	99.7 j/	2,549 k/	3.87 l/	2,544	3.86 i/	88.8
1955	143	94.8 j/	2,742 k/	3.86 l/	2,599	3.66 i/	93.2
1956	N.A.	N.A.	N.A.	N.A.	2,513	3.41 i/	92.0
1957	136 m/	95.0	2,749 k/	3.44 l/	2,613	3.27 n/	93.0
1958	114 o/	96.1	2,933 k/	N.A.	2,819	3.15 n/	94.0
1959	N.A.	N.A.	N.A.	N.A.	2,909	3.04 p/	93.2
1965 Plan	N.A.	N.A.	N.A.	N.A.	3,507	2.41 q/	91.3

a. Including common carrier only.
b. Operating cost per traffic-kilometer multiplied by total traffic-kilometers. (Traffic-kilometers equals freight-kilometers plus passenger-kilometers.)
c. Data for 1940-53 are from source 55/; data for 1954-65 were computed from operating cost per traffic-kilometer for railroad transport.
d. Data for 1951, 1952, and 1954 are from source 56/; for 1950, 1953, and 1955-58 from source 57/; and for 1965 from Table 1, p. 5, above.
e. The magnitude of the deficits for these years is unknown.
f. Operating cost per traffic-kilometer as a percent of railroad operating cost multiplied by railroad operating cost.
g. Operating revenue per traffic-kilometer multiplied by total traffic-kilometers.
h. 58/
i. 59/
j. 60/
k. Profits plus operating cost.
l. Gross operating revenue divided by total traffic-kilometers.
m. 61/
n. 62/. Cost in 1958 decreased by 14 percent from 1955. Data for 1957 were interpolated.
o. 63/. Estimated from data for the first 9 months of operations.
p. 64/. Plan.
q. 65/

Operating ratios for inland water transport are very high as a result of relatively low rates and high operating costs. The ratio is believed to have exceeded 100 between 1945 and 1953 and by 1957 was about 95. As a result, operating losses were incurred throughout the postwar period until 1954. Since that year, there have been small operating profits, but these have not been sufficient to offset other nonoperational expenses as defined in the system of accounts.* It has been estimated that the operating ratio would have to be lowered to about 85 in order to cover these additional expenses. In order to make the inland water fleet financially self-sufficient -- that is, to cover capital investments, which are now completely subsidized, as well as operating and nonoperating expenses -- it would be necessary to lower the ratio to about 57. 66/

B. Rates

In order to make rates and operating costs more compatible, a tariff containing new rates was introduced in January 1957 (the first major revision since 1940) that resulted in a general reduction in rates of 10 to 20 percent. Special reductions as high as 30 percent were put into effect as a stimulus to encourage more combined rail-water shipments and simultaneously to reduce unit operating costs by increasing traffic density. Rates for shipments of petroleum by the Volga Tanker Steamship Agency were reduced 30 percent, and rates for the towing of rafts by the Volga Consolidated and Kama Steamship Agencies were reduced 15 percent. Rates for shipment of dry cargo were reduced for steamship agencies of the Eastern Basin but were unchanged in other areas.** 67/

Although officials in inland water transport continue to complain that commodities, particularly petroleum products, are not being diverted to water carriers from the higher-cost rail lines, the new tariff apparently has met with some success. During the 12-year period 1946-57, combined rail-water hauls increased 200 percent. In 1958 alone, combined hauls increased 35 percent and accounted for 36.7 million tons, more than 20 percent of all inland water freight hauled. 68/

* Nonoperating expenses include training, research, administration, and maintenance of the waterways.

** Unlike rates for rail transport, which apply to the whole network, rates for inland water transport vary from one steamship agency to another and, before 1957, varied from one river to another.

C. Average Costs in Different Basins*

1. Central Basin

In general, transportation on rivers of the Central Basin, particularly on the Volga River, is the least costly in the USSR because of the longer navigation seasons, more favorable operating conditions, and the availability of a greater percentage of the larger, more modern ships and mechanized shore facilities, as shown in Table 12. Consequently, the cargo turnover, representing more than one-half of total river shipping and consisting of proportionately large amounts of low-cost petroleum and rafted timber, has been profitable and affords substantial subsidies to other areas of operation.

Table 12

Average Operating Costs of Selected Steamship Agencies in Inland Water Transport of the USSR a/
1956

Steamship Agency	Current Kopecks per Metric Ton-Kilometer	Percent of National Average
Volga Consolidated	2.84	93.6
Volga Tanker	0.96	31.5
Northwestern	5.44	179.4
Northern	3.23	106.6
Irtysh	3.83	126.3
Lena	9.47	312.5
Amur	7.26	239.6
National average	3.03	100.0

a. 69/. Data include only cargo operating costs.

2. Northwestern and Northern Basins

Costs in the Northwestern Basin are high, primarily because of the extensive lock structures of the Baltic - White Sea Canal

* Absolute data on revenue and profitability in inland water transport seldom are published in detail.

System. The short navigation seasons and the conditions of the riverbeds in the Northern Basin are not conducive to extensive shipping. The proportionately large amounts of rafted timber in the Northern Basin account for relatively low average operating costs, but, should a requirement arise for increased movement of dry cargo, operating costs would increase sharply.

3. Eastern Basin

The costs of transportation in the Eastern Basin are necessarily high but must be sustained because of a lack of any alternative type of transport adequate to serve the economic development of the area. Relatively short navigation seasons and the fluctuation of the riverbeds restrict the movement of various types of ships to different sectors of the rivers and result in a high percentage of transshipments and the use of a greater number of ships in proportion to the volume of cargo carried.

The most informative data on the cost of shipping in this basin are those for the Lena River, but conditions that cause the high costs on this river are typical of those of other rivers in the Eastern Basin,* and the scale may be considered to be applicable to all, as shown in Table 13.**

D. Average Costs for Principal Commodities

Of the major commodities transported on the inland waterways of the USSR, timber rafts incur the lowest operating costs and dry cargoes the highest. The average cost of transportation in terms of both total cargoes and of cargoes in the individual basins usually is influenced by the proportional turnover of rafted timber and dry cargoes and the conditions under which they are hauled. The very large percentage of bulk petroleum shipped on the Volga River explains the unusually low operating costs on that river. The cost of hauling rafted timber is lowest on rivers where a favorable current promotes the movement of the rafts and reduces the requirement for fuel and power.

The changing character of inland water transport in the USSR, however, is necessitating the hauling of increasing amounts of timber as dry cargo. This change is not of significant economic advantage

* Over-all operating costs on the Ob' and Irtysh Rivers generally are not so high as on the more easterly rivers of this basin, because of a concentration of traffic in the upper, less complex riverbeds, whereas on the other rivers, longer hauls through more difficult terrain are necessary.

** Table 13 follows on p. 27.

Table 13

Comparison of Average Operating Costs of Inland Water Transport with Average Operating Costs on the Volga and Lena Rivers 1955

Current Kopecks per Metric Ton-Kilometer

Inland Water Cargo	USSR a/	Volga a/	Lena b/
Average	3.10	1.49	9.55
Petroleum and petroleum products	1.64	1.00	10.85
Rafted timber	0.99	0.51	1.37
Dry cargo			
In self-propelled ships	3.97	1.89	
In non-self-propelled ships	6.11	3.10	12.89 c/

a. 70/. Individual categories for the USSR have been interpolated on the basis of percentage variations of national averages. The national figure is estimated on the basis of 1956 data.
b. 71/
c. In 1955 the dry cargo fleet on the Lena River was composed almost entirely of non-self-propelled craft. 72/

unless the ships are self-propelled.* At the present time the average cost of shipping dry cargo is unusually high because of both a lack of suitable ships and a requirement for disproportionately large amounts of haulage on Siberian rivers where navigation conditions are unfavorable.

The Seven Year Plan specifies that operating costs are to be reduced 23.5 percent. 73/ This reduction may be possible if the plan for investment is strictly adhered to and if a significantly increased number of self-propelled cargo ships are made available.

During the Seven Year Plan, annual investments in inland water transport are to increase to about 2.2 billion rubles per year, or 30 percent more than the average during the preceding 7-year period. 74/ By comparison, investments in rail transport are to increase by nearly 88 percent. At the same time, freight traffic by inland water transport is scheduled to increase by about 65 percent, whereas freight traffic by rail is scheduled to increase by only 40 to 45 percent.

* Comparative costs of shipping timber in rafts and as dry cargo are shown in Table 13.

Whether or not the planned investments in inland water transport are sufficient is conjectural. It is probable that the traffic plan will be fulfilled but that the decreases planned in operating costs will be difficult to achieve.

APPENDIX A

ORGANIZATION OF THE INLAND WATER FLEET OF THE USSR

In March 1946, following World War II, the Peoples Commissariat of the River Fleet (Narodnyy Komissariat Rechnogo Flota -- NKRF) became the Ministry (All-Union) of the River Fleet (Ministerstvo Rechnogo Flota -- MRF). In March 1953, in the reorganization following the death of Stalin, the Ministry of the River Fleet was united into a single ministry together with the Ministry of the Maritime Fleet (Ministerstvo Morskogo Flota -- MMF). Reorganization in August 1954 again placed the inland fleet in a separate ministry. In June 1956 the All-Union Ministry of the River Fleet was abolished, and its organizations and establishments were transferred to the control of the individual republics. All river fleets, other than those in the RSFSR, are administrations directly subordinate to the Council of Ministers of their respective republic. The only organization with ministry status is that of the RSFSR the chief of which, Zosima Alekseyevich Shashkov, is the former head of the All-Union Ministry.

At the present time the common carrier fleet consists of 16 major steamship agencies subordinate to the RSFSR and of smaller lines that operate within the 13 other republics.* Ninety percent of the traffic turnover in the USSR is carried out by the steamship agencies in the RSFSR.**

* Shipping by noncommon carrier is conducted by private and state organizations. The amount of cargo carried by noncommon carriers usually exceeds that carried by the common carrier steamship lines but is hauled for short distances only. Information on the operations of the noncommon carriers is limited, and, unless specifically stated, all figures in this report refer to the activities of common carriers.

** For a list of the 16 major steamship agencies of the RSFSR, their administrative headquarters, and their ares of operations, see Table 14, which follows on p. 30, below, and for a list of the principal rivers and canals of the USSR, see Table 15, which follows on p. 31, below.

Table 14

Major River Steamship Agencies in Inland Water Transport of the USSR

Basin	Steamship Agencies	Headquarters	Area of Operations
Central	Kama	Molotov	Kama
	Volga Consolidated	Gor'kiy	Volga
	Volga Tanker	Kuybyshev a/	Volga
	Moscow	Moscow	Moscow, Oka, Moscow - Volga Canal
	Belaya	Ufa	Belaya
	Volga-Don	Rostov-on-Don	Volga - Don Canal
Northwestern	Northwestern	Leningrad	Neva, Ladoga Canal, Svir', Sheksna, Mariinskiy Canal
	White Sea - Lake Onega	Petrozavodsk	White Sea - Baltic Canal
Northern	Northern	Arkhangel'sk	Northern Dvina
	Pechora	Pechora	Pechora
Eastern	Ob'	Novosibirsk	Ob'
	Irtysh	Omsk	Irtysh
	Yenisey	Krasnoyarsk	Yenisey
	East Siberian	Irkutsk	Angara, Lake Baykal
	Lena	Yakutsk	Lena
	Amur	Khabarovsk	Amur

a. 75/. In March 1959 the administration of the Volga Tanker Steamship Agency was transferred from Astrakhan to Kuybyshev.

Table 15

Principal Rivers and Canals of the USSR

System	Length (Kilometers)
Total length	500,000
Of which:	
Rivers	
Volga	3,690
Lena	4,270
Ob'	3,676
Irtysh	4,422
Yenisey	3,354
Amur	2,846
Canals	
Stalin (Lake Onega - White Sea)	230
Ladoga Side Canal (Neva River - Svir' River)	168
Mariinskiy (Lake Onega - Rybinsk Reservoir)	451
Moscow-Volga (Ivan'kovo-Moscow)	128
Volga-Don (Stalingrad-Kalach)	101
Dnepr'-Bug Canal System a/	1,028
Total navigable rivers (including canals)	131,900

a. This system provides a connection between the Black Sea and the Baltic Sea but is limited to small craft and is of little traffic significance. The system consists mainly of a series of linking rivers from the confluence of the Pripyat' and Dnepr' Rivers and continues on to Pinsk, Kobrin, Brest, and Modlin via the Pripyat', Pina, Vistula, and Bug Rivers.

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APPENDIX B

METHODOLOGY

The estimated growth since 1945 of the capacity of the self-propelled fleet of the USSR in terms of horsepower and of the non-self-propelled fleet in terms of deadweight tonnage is based on recently published but incomplete data, on the estimated degree of plan fulfillment in the shipbuilding industry, and on increases in the acquisition of ships that were projected for each of the 5-year plans, minus minimum retirements for ships.

Attempts to estimate the size and composition of the inland water fleet of the USSR in more detail are frustrated by the absence of essential data. It has not been possible, for example, to separate the horsepower represented by tugs from that represented by cargo ships. Percentage figures relating to trends or changes in the characteristics of the fleet have been incorporated when significant.

Estimates of traffic have been derived from announced data on performance. Adjusted data for the RSFSR, which represents about 90 percent of the total traffic turnover of the USSR, were used where national totals were not available. Where information is completely lacking, figures are based on increment increases observed in past years.

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